

Claims

1. A powder injection microchip comprising:
a gas supply inlet for supplying gas;
5 an outlet;
a channel in fluid connection with the gas supply inlet and the outlet;
and
a powder inlet in fluid connection with the channel for receiving a first,
open end of a powder reservoir, the powder reservoir having an opening at or
10 near to a second end of the powder reservoir to allow egress of gas from the
powder reservoir at a point distal to the first end of the powder reservoir.
2. A powder injection microchip according to claim 1 further comprising
control means for controlling the supply of gas via the gas supply inlet, the
15 control means being arranged, in use:
 - (i) to supply gas via the gas supply inlet to the channel and the
powder inlet at a velocity sufficient to cause fluidisation of powder at the
powder inlet;
 - (ii) to reduce the supply of gas to cause powder to pass from the
20 powder inlet and to collect in a region of the channel adjacent a point where the
powder inlet connects with the channel; and
 - (iii) to repeat steps (i) and (ii) as many times as required, subsequent
initialisation of step (i) causing the powder collected in the channel to be
moved by the gas towards the outlet.
- 25 3. A powder injection microchip for use with a powder reservoir having a
first, open end and an opening at or near to a second end of the powder
reservoir to allow egress of gas from the powder reservoir at a point distal to

the first end of the powder reservoir; the powder injection microchip comprising:

a gas supply inlet for supplying gas;
an outlet;

5 a channel in fluid connection with the gas supply inlet and the outlet;
a powder inlet in fluid connection with the channel for receiving a powder reservoir; and

control means for controlling the supply of gas via the gas supply inlet, the control means being arranged, in use:

10 (i) to supply gas via the gas supply inlet to the channel and the powder inlet at a velocity sufficient to cause fluidisation of powder at the powder inlet;

(ii) to reduce the supply of gas to cause powder to pass from the powder inlet and to collect in a region of the channel adjacent a point where the powder inlet connects with the channel; and

15 (iii) to repeat steps (i) and (ii) as many times as required, subsequent initialisation of step (i) causing the powder collected in the channel to be moved by the gas towards the outlet.

20 4. A powder injection microchip according to claim 2 or 3 wherein in step (ii) the supply of gas is reduced to zero.

5. A powder injection microchip according to any preceding claim comprising at least two planar layers in at least one of which the channel is formed.

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6. A powder injection microchip according to any preceding claim wherein the width of the channel is less than 5mm.

7. A powder injection microchip according to any preceding claim wherein the channel includes a bifurcated section, each branch of the bifurcated section being in fluid connection with the powder inlet.
- 5 8. A powder injection microchip according to any preceding claim wherein the amount of powder collected in the channel is determined by at least one of the following, separately or in combination:
- i) the height of the powder in the powder reservoir
 - ii) the dimension of the powder inlet
- 10 9. A powder mixing system incorporating a powder injection microchip according to any preceding claim.
- 15 10. A powder injection method for use with a powder injection microchip, the powder injection microchip comprising:
- a gas supply inlet for supplying gas;
 - an outlet;
 - a channel in fluid connection with the gas supply inlet and the outlet;
 - a powder inlet in fluid connection with the channel, for receiving a first,
- 20 open end of a powder reservoir, the powder reservoir having an opening at or near to a second end of the powder reservoir to allow egress of gas from the powder reservoir at a point distal to the first end of the powder reservoir;
- the method comprising the steps of:
- (i) supplying gas via the gas supply inlet to the channel and the
- 25 powder inlet at a velocity sufficient to cause fluidisation of powder at the powder inlet;
- (ii) reducing the supply of gas to cause powder to pass from the powder inlet and to collect in a region of the channel adjacent a point where the powder inlet connects with the channel; and

(iii) repeating steps (i) and (ii) as many times as required, subsequent initialisation of step (i) causing the powder collected in the channel to be moved by the gas towards the outlet.

5 11. A powder injection method according to claim 10 wherein in step (ii) the supply of gas is reduced to zero.

12. A powder injection method according to claim 10 or 11 wherein the amount of powder collected in the channel is determined by at least one of the
10 following, separately or in combination:

- i) the height of the powder in the powder reservoir
- ii) the dimension of the powder inlet

13. A powder mixing method including the powder injection method
15 according to any of claims 10 to 12.